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June 20, 1994

BY HAND DELIVERY

Mr. William F. Caton  
Acting Secretary  
Federal Communications Commission  
1919 M Street, N.W., Room 222  
Washington, D.C. 20554

RE: In the Matter of Amendment of the Commission's  
Rules to Establish Rules and Policies Pertaining  
to a Mobile Satellite Service in the 1610-  
1626.5 MHz and 2483.5-2500 MHz Frequency Bands  
CC Docket No. 92-166

Dear Mr. Caton:

Transmitted herewith for filing with the Commission on  
behalf of Loral/QUALCOMM Partnership, L.P., are an original and  
ten copies of its "Reply Comments."

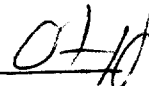
Should there be any questions regarding this matter, please  
communicate with this office.

Very truly yours,

  
William D. Wallace

Enclosures

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Before The  
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Washington, DC 20554

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Satellite Service in the 1610- )  
1626.5 MHz and 2483.5-2500 MHz )  
Frequency Bands )

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CC Docket No. 92-166

REPLY COMMENTS OF  
LORAL/QUALCOMM PARTNERSHIP, L.P.

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Dated: June 20, 1994

## TABLE OF CONTENTS

	PAGE
I. SUMMARY . . . . .	1
II. THE COMMENTERS AGREE THAT THE COMMISSION'S SPECTRUM-SHARING PROPOSAL PROVIDES A METHOD TO LICENSE FIVE LEO MSS SYSTEMS . . . . .	7
A. The L-Band Sharing Plan Should Be Adopted . . . . .	8
B. The Commission Should Reject Any "Interim" Plan . . . . .	11
1. An Interim Plan Is Premature and Unnecessary Because the Requirements for Protection of GLONASS May Not Be Needed . . . . .	12
2. An Interim Plan Is Not Necessary to Accommodate Use of GNSS for Air Navigation in the U.S . . . . .	14
3. An Interim Plan Would Impede MSS Because It Suggests That GLONASS Equipment Manufacturers and Other Countries Need Not Plan for the Change in GLONASS . . . . .	16
4. An Interim Plan Is Useless Because of the Difficulty in Protecting In-Band GLONASS Operations at the EIRP Levels Specified by FAA and ARINC . . . . .	17
C. All S-Band Should Be Assigned to CDMA Systems . . . . .	18
D. The CDMA L-Band Segment Should Not Be Reduced . . . . .	21
1. Reducing the CDMA Bandwidth Would Make International Coordination More Difficult . . . . .	21
2. Reducing the CDMA Bandwidth Would Make Sharing with Radioastronomy More Difficult . . . . .	23
3. Reduction of the CDMA Bandwidth Could Seriously Impair Competitive Operation of a CDMA System . . . . .	24
4. Motorola Has Provided No Justification for Reduction of the CDMA Bandwidth . . . . .	26
E. The Commission Should Reject TRW's Proposal for Extraterritorial Extension of the Band-Sharing Plan . . . . .	27

F.	The Commission Must Require Newly-Launched Systems to Coordinate with In-Orbit Systems . . .	29
G.	The Commission Should Adopt Two Additional Proposals Which Facilitate MSS Operations . . .	30
III.	USING AUCTIONS, LOTTERIES OR COMPARATIVE HEARINGS TO ASSIGN MSS SPECTRUM WOULD NOT SERVE THE PUBLIC INTEREST . . . . .	31
A.	Neither Comparative Hearings Nor Lotteries Are Feasible Methods for Assignment of MSS Above 1 GHz Spectrum . . . . .	31
B.	All the LEO Applicants Agreed That MSS Spectrum Auctions Would Be Contrary to the Public Interest.	33
C.	Were the Commission to Use MSS Spectrum Auctions, It Should Initiate Another Proceeding to Develop an Appropriate Auction Procedure . . .	35
IV.	THE COMMISSION SHOULD ADOPT ELIGIBILITY REQUIREMENTS FOR MSS ABOVE 1 GHZ WHICH ENSURE EFFICIENT USE OF SPECTRUM AND EXPEDITED DELIVERY OF NEW AND ENHANCED MSS TO THE PUBLIC . . . . .	38
A.	MSS Above 1 GHz Should Be Reserved for LEO Systems. . . . .	38
1.	LEO Systems Provide Societal, Economic, and Technical Benefits Over GSO Systems . . . . .	39
2.	AMSC Has Not Shown That GSO Systems Should Be Licensed . . . . .	41
B.	Geometric Coverage Standards Should Be Adopted . .	44
C.	A Spectrum Efficiency Standard Should Be Adopted .	49
D.	The Comments Demonstrate That the DOMSAT Financial Standard Is Appropriate for MSS Above 1 GHz . . .	50
E.	The Commission Has the Authority to Adopt Rigorous Eligibility Requirements for MSS Above 1 GHz . . .	55
V.	SHARING BETWEEN MSS ABOVE 1 GHZ SYSTEMS AND OTHER SERVICES CAN BE ACCOMPLISHED IN THE 1.6/2.4 GHZ BANDS .	56
A.	Radio-Astronomy Service . . . . .	56

B.	Aeronautical Radio-Navigation and Radio-Navigation Satellite Services . . . . .	60
C.	Terrestrial Services (In-Band) . . . . .	66
D.	Terrestrial Services (Adjacent Band) . . . . .	67
VI.	THE COMMISSION HAS DEVELOPED A SUFFICIENT RECORD TO PROCEED WITH C-BAND FEEDERLINKS FOR MSS LEO SYSTEMS . .	68
VII.	THE MSS LEO APPLICANTS SHOULD BE REQUIRED TO COMMENCE COORDINATION IMMEDIATELY . . . . .	71
VIII.	THE COMMISSION SHOULD ADOPT STRICT IMPLEMENTATION MILESTONES . . . . .	75
A.	Milestone Compliance Should Be Strengthened . . .	76
B.	The Commission Should Adopt a Milestone for Initiation of Service But Not for Construction of Ground Segment . . . . .	79
C.	TRW's Definition of "Construction" Is Unnecessary .	82
IX.	THE COMMENTS CONFIRM THAT MSS ABOVE 1 GHZ SHOULD BE DESIGNATED AS A PRIVATE MOBILE RADIO SERVICE AND SYSTEM OPERATORS SHOULD BE DEEMED NON-COMMON CARRIERS .	82
X.	THE COMMISSION SHOULD ADOPT REVISED SYSTEM LICENSING RULES IN ORDER TO FACILITATE INTRODUCTION OF MSS LEO SYSTEMS . . . . .	86
A.	License Term . . . . .	86
B.	Blanket License . . . . .	87
C.	Replacement Satellites . . . . .	88
D.	Timing of Applications for Replacement Systems . .	90
E.	Replacement Expectancy . . . . .	90
F.	Reporting Requirements . . . . .	91
G.	Milestone Reports . . . . .	92
H.	1.6/2.4 GHz MSS Earth Station Licensing . . . . .	93
I.	Distress & Safety . . . . .	94
XI.	CONCLUSION . . . . .	95

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CC Docket No. 92-166

To: The Commission

REPLY COMMENTS OF  
LORAL/QUALCOMM PARTNERSHIP, L.P.

Loral/QUALCOMM Partnership, L.P. (LQP), hereby responds to the comments filed with regard to the licensing rules for the Mobile-Satellite Service (MSS) set forth in the Commission's Notice of Proposed Rule Making, 9 FCC Rcd 1094 (1994) (NPRM). LQP is an applicant to construct Globalstar, a global, low-earth orbit satellite telecommunications system (File Nos. 19-DSS-P-91(48) and CSS-91-014).

I. SUMMARY

The Commission has a mandate from the parties filing comments in this proceeding to move forward expeditiously to implement spectrum-sharing, interservice coordination and system licensing rules and policies for MSS Above 1 GHz. While some minor modifications are needed in the Commission's NPRM proposals, the comments of the "Big LEO" applicants, satellite system equipment manufacturers, and potential consumers of

Mobile-Satellite Services (MSS) agree with the framework of the Commission's proposed rules and recommend prompt action to make the benefits of low-earth orbit (LEO) systems available in the near future.

Spectrum-Sharing. The LEO applicants all support the Commission's spectrum-sharing proposal as a workable framework to license all qualified LEO systems. However, a few issues integrally related to the band-sharing plan must be resolved before the Commission's proposal can be placed into final form:

- Avoiding a "transition" plan for GLONASS. Several parties recommended that the Commission adopt a "transition" plan to accommodate MSS operations pending the anticipated downward shift in the GLONASS frequency plan. This recommendation should be rejected as unnecessary. All signs indicate that the modification in the GLONASS frequency plan will be accomplished by the time the MSS LEO systems are launched; and, even if GLONASS continues operating in the 1610-1616 MHz band as part of GNSS, corruption of GLONASS signals on these frequencies would not impair air navigational objectives. Furthermore, adopting a "transition" plan would be likely to delay implementation of modifications to GLONASS equipment specifications and impede the development of MSS systems. In any event, if a "transition" plan were devised for protection of GLONASS signals up to 1616, the required protection levels would likely negate the ability of MSS systems to operate in the remaining L-band segment.

◦ Granting access to all of S-band. The applicants proposing to use S-band downlinks have all recommended that the Commission allocate the entire 2483.5-2500 MHz band for MSS. These parties all point out that MSS uplink and downlink frequencies are not regulated in the same manner, and so, S-band cannot be segmented in the manner proposed for L-band. Providing access to all of S-band enhances MSS system capacity and the ability to coordinate with existing terrestrial users. It also avoids substantial costs which would be incurred in system design to accommodate a smaller downlink frequency assignment.

◦ Preserving the CDMA segment in L-band. The CDMA applicants and other interested L-band users provided substantial information demonstrating that the Commission should not reduce the proposed 11.35 MHz L-band segment for CDMA technology if only one U.S. system is implemented. In this aspect, the Commission's band-sharing proposal ignored the likely presence of a foreign MSS system using the same bands with which any U.S. system would have to coordinate. Reducing the CDMA segment would make coordination with such systems more difficult. Moreover, CDMA systems must protect Radio-Astronomy Service sites, and need spectrum up to 1621.35 MHz for users operating within RAS protection zones. And, the RAS community pointed out that increasing the bandwidth available to the TDMA system's secondary downlink could "close the window to the Universe."

The apparent divergence in the comments on these three issues should not be allowed to obscure the overriding goal of



the Commission in this proceeding: to facilitate and expedite the development of MSS systems. This objective can be achieved by rejecting a "transition" plan which would impair the ability to use MSS spectrum, granting CDMA systems access to all of S-band to enhance MSS capacities, and preserving the proposed 11.35 MHz for CDMA in all contingencies.

Eligibility Requirements. With the exception of AMSC, the applicants generally agreed that the Commission should restrict MSS Above 1 GHz to LEO systems and require global and U.S. coverage for all licensed systems. AMSC failed to present any reason sufficient to modify the Commission's conclusion that the public interest would be served by diversifying the satellite technologies available for delivery of MSS and reserving the MSS Above 1 GHz bands for LEO systems. Motorola proposed unnecessarily stringent service and financial requirements for MSS Above 1 GHz; and, several applicants proposed relaxing the financial standards in ways contrary to Commission policy. The arguments presented for these drastic revisions in the Commission's proposals are unconvincing. The Commission's initial proposals were generally on target, and should be adopted with minor revisions.

Interservice Sharing. The Commission should heed the comments of the Radio-Astronomy Service parties and provide protection for valuable RAS observations from secondary MSS downlinks as well as primary MSS uplinks. With respect to Aeronautical-Radio-Navigation Service, the comments do not

detract from the proposals for protection of GPS and GNSS in LQP's initial comments. Similarly, LQP has addressed and satisfied in its initial comments all concerns raised by terrestrial fixed service users. In short, coordination between MSS systems and existing users in the band can be achieved so as to allow implementation of all qualified LEO systems.

Feederlinks. Since the initial comments were filed, further developments in the use of C-band have occurred which confirm LQP's analysis that C-band is available for MSS feederlinks. Thus, the Commission should work with LQP to make MSS LEO feeder link spectrum available in the 5000-5250 MHz and 6875-7075 MHz bands.

Licensing Policies and Rules. The parties generally agreed on the Commission's implementation milestones and licensing rules for MSS Above 1 GHz. And, all commenting parties agreed that the provision of MSS space segment should be deemed non-common carriage and a private mobile radio service. While there are minor differences in the language proposed by various parties for licensing rules, the Commission's initial proposals clearly provide the basis for rapid adoption and implementation. With respect to coordination among MSS licensees, LQP submits that such coordination should be initiated in the near future among the applicants, including discussion of parameters for CDMA sharing and out-of-band emissions protection between the CDMA and TDMA band segments.

Overall, the comments confirm that the Commission's proposed rules represent a substantial and promising step toward implementation of LEO MSS systems. These sentiments of the commenting parties are consistent with the expressed desire of the Commission and the Administration to implement the technical and economic benefits of satellite telecommunications. According to Chairman Hundt, "[s]atellite technology offers opportunities to build a global, seamless connection among all networks" on the information highway.<sup>1</sup> Vice President Gore also has recognized that LEO satellite systems would "make universal access both practical and affordable."<sup>2</sup> And, Commissioner Chong recently noted the vital role of global satellite communications systems in "bring[ing] the benefits of telephone and interactive video and data services to even the remotest parts of the world."<sup>3</sup>

LQP stands ready to play this vital role through GLOBALSTAR. The comments of LQP and other parties reflect a desire that the Commission allow the LEO systems to progress rapidly toward these goals. Accordingly, LQP urges the Commission resolve the few remaining issues in this proceeding and license qualified LEO applicants to commence construction of these global MSS systems before the end of 1994.

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<sup>1</sup> Chairman Hundt, Speech to the World Telecommunication Development Conference (Mar. 22, 1994).

<sup>2</sup> Vice President Gore, Speech to the International Telecommunications Union (Mar. 21, 1994).

<sup>3</sup> Commissioner Chong, Testimony before the U.S. Senate Commerce, Sciences and Transportation Committee (May 11, 1994).

II. THE COMMENTERS AGREE THAT THE COMMISSION'S SPECTRUM-SHARING PROPOSAL PROVIDES A METHOD TO LICENSE FIVE LEO MSS SYSTEMS.

In the NPRM, the Commission proposed a spectrum-sharing plan which was designed to expedite the award of licenses to qualified LEO applicants without the need for further proceedings. NPRM, 9 FCC Rcd at 1111, ¶ 32. LQP and the other four LEO applicants agreed in their respective comments that the Commission had proposed a workable plan which would accommodate operations by all five LEO systems. See LQP Comments, at 30-31; Constellation Comments, at 24-25; Ellipsat Comments, at 13-15; Motorola Comments, at 34-36; TRW Comments, at 55.

A few issues remain for resolution because, as the applicants note, there is a substantial difference in availability for MSS use between the 11.35 MHz proposed for CDMA operations and the 5.15 MHz for TDMA. See Constellation Comments, at 22-23; TRW Comments, at 62. The 1610-1616 MHz band is impaired by coordination requirements with the Radio-Astronomy Service (RAS) and the Aeronautical Radio-Navigation Service (ARNS). Moreover, four systems would be required to coordinate and share the CDMA bandwidth, but Motorola would be assigned the TDMA segment exclusively. While LQP can accept the proposed L-band spectrum assignments in order to resolve this proceeding and expedite licensing, it objects to additional impairments to CDMA operation, such as adopting an "interim" plan, limiting access to the entire S-band and reducing the bandwidth of the CDMA L-band segment. As discussed below and in LQP's initial comments,

adoption of these proposals would hinder the technical operations of CDMA systems and impair their ability to compete with the TDMA system, AMSC's GSO system, and systems authorized by other countries or administrations. LQP's support for the band-sharing plan remains conditioned on resolving these issues in ways which do not impair CDMA operations.

In proposing the band-sharing plan, the critical question for the Commission was whether its plan could be used as a framework to resolve mutual exclusivity among qualified applicants. NPRM, 9 FCC Rcd at 1114, ¶ 38. Despite the few details in the overall plan which remain for resolution, the comments reflect that the Commission's proposal is an "engineering solution" which avoids mutual exclusivity in this proceeding. See Omnibus Budget Reconciliation Act of 1993, Pub. L. 103-66, § 6002, 107 Stat. 390 (codified at 47 U.S.C. § 309(j)(6)(E)). Accordingly, LQP urges the Commission to implement the plan by resolving the three critical issues for facilitating MSS operations as outlined below and then licensing qualified applicants before the end of this calendar year.<sup>4</sup>

A. The L-Band Sharing Plan Should Be Adopted.

As LQP pointed out in its initial comments, a spectrum-sharing plan must meet certain criteria in order to resolve the issues which have been raised in this proceeding. LQP Comments,

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<sup>4</sup> This section also includes LQP's responses to certain modifications in the band-sharing plan proposed by other applicants.

at 45-49. It must allow the Commission to proceed expeditiously with licensing qualified LEO applicants, leave spacecraft design decisions to applicants, facilitate multiple entry and competition, ensure the use of the entire spectrum allocated for MSS, and accommodate all five LEO applicants.

Most commenters agree that the Commission's framework for sharing the MSS uplink frequencies accomplishes these goals. First, as indicated above, the five LEO applicants state that their respective systems could be accommodated if each of the other LEO systems were licensed and the MSS uplink frequencies were segmented into an 11.35 MHz band for CDMA systems and a 5.15 MHz band for TDMA systems. No L-band spectrum would lie fallow under this plan.

Moreover, several commenters point out that, by not eliminating any applicant through auctions, lotteries or comparative hearings, the Commission can promote multiple entry and competition in the new MSS LEO service. See Motorola Comments, at 34-36; Ellipsat Comments, at 13-14. Additionally, the plan appears to serve the interests of the public in having opportunities for less costly and more innovative service offerings. Equipment manufacturers such as Fairchild Space and Defense Corporation, Westinghouse Electric Corporation and Harris Corporation, all of which are contractors for Ellipsat, also urged the Commission to adopt the plan because it allows multiple "Big LEO" systems to be licensed and "diverse systems to

implement their business plans." Harris Comments, at 7; see Fairchild Comments, at 2; Westinghouse Comments, at 7.

The Commission's band-sharing plan and proposed rules also provide the opportunity for diversity in system design. One deviation from this approach was proposed by Motorola, that the Commission restrict system design among the current processing group so as not to permit an amendment to use TDMA access technique. Motorola Comments, at 37 n.26. There is no indication in the comments of the pending CDMA applicants of any desire for such an amendment. Under these circumstances, LQP believes that the Commission should adhere to its policy "to leave spacecraft design decisions to the space station licensees."<sup>5</sup> NPRM, 9 FCC Rcd at 1100, ¶ 11.

LQP's primary requirement for a spectrum-sharing plan was that it allow the Commission to proceed quickly to license qualified applicants. Based on the comments in this proceeding, the Commission can and should "proceed expeditiously with licensing." NPRM, 9 FCC Rcd at 1110, ¶ 30. With minor changes, the plan is acceptable to all LEO applicants. Other applicants also urge the Commission to adopt rules and issue MSS

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<sup>5</sup> Although it found the Commission's band-sharing plan acceptable, Constellation suggested that the most fair band-sharing plan would be to assign each applicant 1/n bandwidth of uplink and downlink frequencies and require operators to fit their systems into their respective assignments. See Constellation Comments, at 19. Such a plan is obviously inconsistent with the Commission's policy of not dictating system design, and Constellation apparently does not advocate it for this service.

authorizations on an expedited basis. See Motorola Comments, at 71; Ellipsat Comments, at 3; TRW Comments, at 198.

The comments make clear that expedited processing of the "Big LEO" systems is critical not only to the applicants themselves but also to consumers of MSS service and the telecommunications industry. Potential consumers desirous of the availability of new and enhanced MSS LEO services have urged the Commission to license these MSS systems. See So. Cal. Edison Comments; Peace Corps Comments; Honeywell Comments.

Representatives of the telecommunications industry have also urged the Commission to move expeditiously in this proceeding so that they will obtain the ancillary benefits which would flow from the MSS LEO industry, including the creation of new jobs and commercial opportunities for defense industry contractors. See AirTouch Comments, at 2; Harris Comments, at 5-6; Westinghouse Comments, at 3.

Consumers, equipment manufacturers, service providers and applicants are united in recommending that the Commission take prompt action in this proceeding. Given the support for the overall framework of the Commission's spectrum-sharing plan, there is simply no reason to delay.

B. The Commission Should Reject Any "Interim" Plan.

The effectiveness of the Commission's band-sharing plan would be greatly enhanced by rejection of any so-called "interim" or "transition" plan to anticipate continued GLONASS operations



in the 1610-1616 MHz band. See NPRM, 9 FCC Rcd at 1110-11, nn. 59 & 64. As LQP explained in its initial comments, the Commission should not inhibit the planned deployment of MSS systems and the utilization of the entire 1610-1626.5 MHz band by adopting prematurely and, in all likelihood, unnecessarily, a plan to accommodate use of GLONASS channels in the band.<sup>6</sup> See LQP Comments, at 66-73. Consideration of such a plan would unduly complicate this proceeding, and, more importantly, its adoption would impair, rather than facilitate, operation of the U.S. MSS LEO systems. Accordingly, LQP urges the Commission to reject all "interim" plan proposals and to endorse the action items proposed by LQP in its initial comments to encourage GLONASS operations moving below 1610 MHz. See Reply Tech. App., at § 2.2.6.<sup>7</sup>

1. An Interim Plan Is Premature and Unnecessary Because the Requirements for Protection of GLONASS May Not Be Needed.

The Russian Federation's GLONASS system has been coordinated pursuant to Article 14 for operations in the 1610-1616 MHz portion of the 1.6 GHz band. The GLONASS frequency plan at one time included 24 satellites, each operating on a separate frequency between 1602 and 1616 MHz. However, since WARC-92

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<sup>6</sup> The Russian Federation has notified the ITU of its plan for shifting the GLONASS frequency plan to below 1606 MHz by 1999.

<sup>7</sup> The Technical Appendix attached to the Reply Comments is referenced as "Reply Tech. App.," and the Technical Appendix in LQP's initial comments as "Tech. App."

adopted a primary allocation for the Radio-Astronomy Service in the 1610.6-1613.8 MHz band, only GLONASS Channels 22, 23 and 24 have remained in use above 1610 MHz.

As both Motorola and LQP pointed out in their comments, the Russian Federation has indicated that it plans to move GLONASS operations below 1606 MHz by 1999 using a different satellite band plan and an anti-podal satellite constellation. LQP Comments, Tech. App., at 12; Motorola Comments, at 44-46; see also FAA Reply Comments, at 1 (filed June 6, 1994) ("ultimate protection band for GLONASS is 1598-1610"). In agreements with Japan, Australia and the Inter-Union Commission on Frequency Allocations, the Russian Federation has stated its intent to move GLONASS operations below 1606 MHz in order to protect RAS by 1998 or 1999. LQP Comments, Tech. App., at 12; Motorola Comments, at 43-44. "These agreements point to future changes in the GLONASS frequency plan as the most likely course of events. Such changes will minimize, if not entirely eliminate, the possibility of interference from MSS systems into GLONASS receivers." Motorola Comments, at 45.<sup>8</sup>

The revised GLONASS frequency plan would eliminate the need for protection requirements for the three remaining in-band channels since they will not be used.<sup>9</sup> These intended

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<sup>8</sup> Motorola also pointed out that GLONASS may not be maintained as a global navigation system. Motorola Comments, at 45-46.

<sup>9</sup> These frequencies are only on the second generation GLONASS spacecraft which have a maximum 3-year lifespan. It is LQP's understanding that the inventory of the second generation

modifications to GLONASS would also eliminate any need for an "interim" plan.

2. An Interim Plan Is Not Necessary to Accommodate Use of GNSS for Air Navigation in the U.S.

As LQP pointed out in its comments, the aviation community, including the Federal Aviation Administration (FAA), has expressed plans to use a Global Navigation Satellite System (GNSS) for en route, oceanic, terminal and non-precision approach navigation. See LQP Comments, Tech. App., at 12; FAA Reply Comments, at 4 (FAA "is planning to implement GNSS domestically and to foster its implementation internationally"). The United States is developing its own 24-satellite Global Positioning System (GPS) to be used within GNSS, which may not utilize GLONASS.<sup>10</sup> See FAA Reply Comments, at 4. Only five satellites of the GNSS system would be needed for position location including integrity checking, and LQP has presented a study which demonstrates, for various combinations of GPS plus GLONASS, that at least six, seven or more satellites would be available. See LQP Comments, Tech. App., at Attach. 1.

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satellites are almost exhausted with only 6-10 unlaunched. The number of these unlaunched satellites with Channels 22, 23, and 24 would probably be only a fraction of the remaining.

<sup>10</sup> FAA may also be using means other than GLONASS to provide integrity measurements with the introduction of Wide Area Augmentation Systems (WAAS), barometric aiding, and local Differential GPS around airports. A request for proposals for a WAAS was recently issued by FAA. See Telecommunications Reports, Vol. 60, No. 24, at 29 (June 13, 1994).

Under these circumstances, LQP believes that, even if the three GLONASS channels above 1610 MHz continue to operate, those signals are not required to achieve navigational objectives under GNSS. The aviation community has not demonstrated that corruption of a single measurement from either a GPS or a GLONASS satellite would cause harmful degradation in the ability to navigate with GNSS. If the GLONASS constellation were populated with 12 satellites operating antipodally, and GNSS included 24 GPS satellites, sufficient integrity would be provided under LQP's proposal. See LQP Comments, Tech. App., Attach. 1. Multiple measurements from satellites in the GPS and GLONASS constellations would be available, and the ability to navigate with the system would not be impaired. As discussed above, the loss of these few GLONASS channels would not affect the ability to perform navigation measurements, particularly because no more than one satellite with these frequencies would likely be in view at any given time.

While FAA has objected to this plan, it has provided no analysis rebutting LQP's study. Indeed, FAA has declined to respond, stating that this proceeding "is not a forum for a detailed critique." FAA Reply Comments, at 1. LQP agrees that the Commission and FAA should establish such a forum to resolve these issues. FAA also claimed that "LQP has not demonstrated such a surgical interference mechanism." Id. at 4. But, in fact, LQP did present such a study, with which the Commission can determine the validity of the LQP plan.

Having failed to critique LQP's proposal, FAA claims that a "transition" plan is "in the best interests of an expeditious implementation and operation of the 'Big LEO' systems." Id. But, the Commission must adopt rules and policies based on fact not speculation regarding GLONASS, GPS and GNSS operations. LQP has provided an analysis which demonstrates that an interim plan is unnecessary even if some GLONASS satellites continue to operate above 1610 MHz.

3. An Interim Plan Would Impede MSS Because It Suggests That GLONASS Equipment Manufacturers and Other Countries Need Not Plan for the Change in GLONASS.

The announced change in the GLONASS frequency plan is a major system modification which will greatly impact the design of avionics hardware compatible with GNSS. Potential GLONASS receiver manufacturers must comply with this frequency change and implement interference mitigation techniques in the design of GLONASS receivers. Filters designed for GLONASS receivers up to 1616 MHz for use with the three channels would not protect GLONASS signals below 1610 MHz from MSS operations in the band once GLONASS operations move entirely below 1606 MHz. Accordingly, equipment manufacturers must commence designing and installing filters at the new GLONASS frequency range below 1606 MHz. Similarly, the aviation community in the United States and abroad must be made aware of the modifications to GLONASS frequencies.

As MSS systems seek to coordinate globally, they should be able to claim the benefit of the new GLONASS frequency plan. If the United States provides for an "interim" plan, which implies that MSS systems can operate in less spectrum than 1610-1626.5 MHz, then revisions to the GLONASS plan would likely become less imperative. Efforts of the United States and MSS industry to encourage the revision to the GLONASS frequency plan might be viewed as optional rather than essential to the development of MSS services, hampering the global development of MSS with the attendant loss of U.S. jobs and increased foreign competition. LQP believes that, in this regard, adopting an "interim" plan would seriously jeopardize the future of MSS operations in the 1610-1626.5 MHz band.

4. An Interim Plan Is Useless Because of the Difficulty in Protecting In-Band GLONASS Operations at the EIRP Levels Specified by FAA and ARINC.

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LQP's analysis indicates that protecting GLONASS Channels 22, 23 and 24 at the EIRP levels specified by the FAA and ARINC in these parties' initial comments would render the 1610-1626.5 MHz band useless for MSS operations. See Reply Tech. App., at § 2.2.1. Thus, providing an "interim" plan is a fruitless exercise because, under the contingency for which it is intended, no MSS system could operate.

The Commission's proposed "interim" plan (NPRM, 9 FCC Rcd at 1111 n.64) and those of the other applicants (see Ellipsat Comments, at 16-17; Constellation Comments, at 25-26; TRW

Comments, at 72-74) are premised on the availability of 10.5 MHz of spectrum above 1616 MHz. However, based on LQP's analysis, there is a substantial question whether MSS systems could operate within the 1616-1626.5 MHz band and protect GLONASS receivers to the levels sought by FAA. There is no reason to plan for a contingency which is not feasible.

Moreover, even FAA has admitted that GLONASS plans to move out of the 1610-1616 MHz band. FAA Reply Comments, at 3. Thus, rather than adopting an "interim" plan based on speculation regarding the availability of MSS spectrum, the Commission should simply plan that -- in accordance with existing policies and procedures -- MSS systems would protect GLONASS below 1610 MHz in accordance with the out-of-band emission limits which LQP proposed in its Comments. See LQP Comments, at 69-70.

C. All S-Band Should Be Assigned to CDMA Systems.

All applicants which sought to use S-band for MSS downlinks agreed with LQP that there is no technical or legal basis for assigning less than 16.5 MHz of the MSS downlink band for use by CDMA systems. See LQP Comments, at 32-26; Constellation Comments, at 28-29; Ellipsat Comments, at 26-27; TRW Comments, at 81-83. Only the Wireless Cable Association International suggested to the contrary. See WCA Comments, at 2-4. However, the WCA noted that the Commission should depend upon MSS proponents for analysis of the utility of the 2483.5-2500 MHz band. These concerns were fully addressed and resolved in LQP's

technical analysis. See LQP Comments, Tech. App., at § 2.3; see also Reply Tech. App., at § 2.3.2.

The Commission's suggestion that less than 16.5 MHz would be sufficient for MSS downlinks is inconsistent with the findings of the MSS Above 1 GHz Negotiated Rulemaking Committee (NRC), which assumed, for its interservice sharing analyses, that the entire S-band would be available for use by CDMA systems. See LQP Comments, at 34-36. Thus, the Commission cannot assign less than 16.5 MHz of S-band to the CDMA systems without vitiating the basis for many of the interservice sharing rules developed by the NRC and proposed for adoption in the NPRM.

Moreover, as LQP and other commenters discussed, the Commission's proposal is technically flawed and is based on an erroneous premise that operations in the forward and return links are equivalent. S-band and L-band have distinct technical characteristics. The downlink is restricted by international and domestic PFD limits, and these limits have a direct impact on the number of users in the spectrum. LQP Comments, at 33. L-band is not so restricted, and as a result, capacity in the forward link at S-band constrains overall system capacity. See LQP Comments, Tech. App., § 1.1. Indeed, segmenting L-band is a possible solution to the band-sharing issue in this proceeding because, while access to the entire L-band would improve CDMA operations, less spectrum in L-band is needed to pair with the 16.5 MHz of spectrum in S-band. Id.



Limiting access to S-band also limits CDMA system capacities. The coordination requirements for S-band with other MSS systems and other services in the band and adjacent bands increases the constraints on downlink capacity. Id. For the Commission to adopt a rule which also takes away frequencies from the downlink would significantly decrease system capacities. Id. Each of the other CDMA applicants independently noted these problems. See, e.g., TRW Comments, at 82; Ellipsat Comments, at 26; Constellation Comments, at App. B.

In addition to these problems with the Commission's S-band proposal, TRW also pointed out that coordination with terrestrial systems can be achieved by allowing CDMA operators access to the entire S-band. The Commission had suggested in the NPRM that reserving an exclusive segment of S-band for existing terrestrial users might improve coordination. NPRM, 9 FCC Rcd at 1113-14, ¶ 37. To the contrary, the flexibility of an MSS system to coordinate S-band would be improved by assigning the entire bandwidth to CDMA licensees. TRW Comments, at 82.

Constellation also explained that the Commission's proposal would impose unnecessary costs:

The capacity available to any single system in any segment of the S-band downlink decreases as the number of systems operating in the band increases. Overall system capacity is retained by operating over a wider bandwidth. However, this requires the satellite to generate and transmit more total power, which entails a heavier and more costly satellite. Coordination of the operational frequency plans among the CDMA LEO system to minimize the number of satellites transmitting in any segment of the 2483.5-2500 MHz band can substantially reduce the cost of individual satellites.